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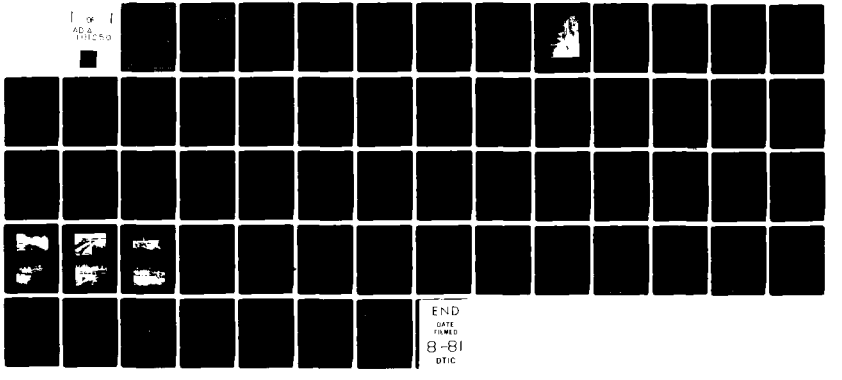

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DELAWARE RIVER BASIN

SPINNER BROOK, WAYNE COUNTY

PENNSYLVANIA

LEVEL II

# WHITNEY LAKE DAM

**NDI ID NO PA-00142**
**DER ID NO 64-133**

## WHITNEY LAKE ASSOCIATION

(10) Frederick Futchko

# PHASE I INSPECTION REPORT

# NATIONAL DAM INSPECTION PROGRAM

National Dam Inspection Program. Whitney Lake Dam (NDI ID Number PA-00142, DER ID Number 64-133), Delaware River Basin, Spinner Brook, Wayne County. Pennsylvania. Phase I Inspection Report,

"Original contains color plates: All DTIC reproductions will be in black and white"



Prepared by
GANNETT FLEMING CORDDRY AND CARPENTER, INC.
Consulting Engineers
Harrisburg, Pennsylvania 17105

(15) DACW31-81-C-0018

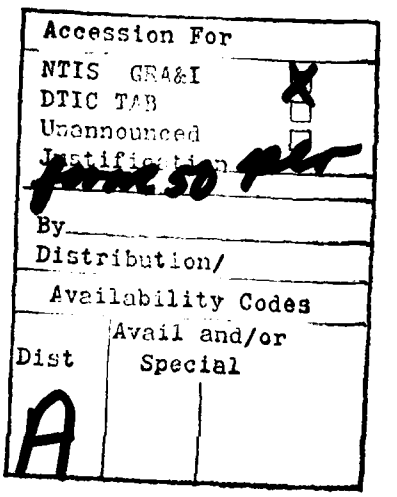
For
DEPARTMENT OF THE ARMY
Baltimore District, Corps of Engineers
Baltimore, Maryland 21203

(11) MAY 1981

DELAWARE RIVER BASIN

SPINNER BROOK, WAYNE COUNTY

PENNSYLVANIA




WHITNEY LAKE DAM

NDI ID No. PA-00142
DER ID No. 64-133

WHITNEY LAKE ASSOCIATION

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

Prepared by

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P.O. Box 1963
Harrisburg, Pennsylvania 17105

For

DEPARTMENT OF THE ARMY
Baltimore District, Corps of Engineers
Baltimore, Maryland 21203

MAY 1981

# PREFACE

This report is prepared under guidance contained in Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigations, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

WHITNEY LAKE DAM

NDI ID No. PA-00142; DER ID No. 64-133

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

CONTENTS



APPENDICES

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

BRIEF ASSESSMENT OF GENERAL CONDITION

AND

RECOMMENDED ACTION

| | |
|---|---|
| Name of Dam | Whitney Lake Dam<br>NDI ID No. PA-00142<br>DER ID No. 64-133 |
| Size: | Small (11.5 feet high; 570 acre-feet) |
| Hazard Classification: | Significant |
| Owner: | Whitney Lake Association<br>Dr. Charles Marston, President<br>P.O. Box 281<br>Hawley, PA 18428 |
| State Located: | Pennsylvania |
| County Located: | Wayne |
| Stream: | Spinner Brook |
| Date of Inspection: | 13 April 1981 |

Based on the criteria established for these studies, Whitney Lake Dam is judged to be in fair condition. The recommended Spillway Design Flood (SDF) for the size and hazard classification of the dam varies between the 100-year flood and 1/2 of the Probable Maximum Flood (PMF). The 1/2 PMF was selected as the SDF. The existing spillway will not pass the 100-year peak flood inflow. If the stoplogs on the spillway crest were removed, the spillway capacity would increase significantly, but it would still be insufficient to pass the 100-year peak flood inflow. The spillway capacity is rated as inadequate.

Several deficiencies were observed at the dam. The most serious are at the spillway, which is structurally deteriorated. Although some maintenance has been performed, the existing maintenance program could be upgraded.

The following remedial measures, listed in approximate order of priority, are recommended to be undertaken by the Owner without delay:

(1) Design and construct a spillway capable of passing a minimum of the 100-year flood. Before this work is accomplished, remove the trash barrier and stoplogs at the spillway so that the spillway capacity is increased during the design period.

(2) Develop a method for drawing down the reservoir in case of an emergency. If a pipe is placed through the embankment, it should be provided with an upstream closure facility.

(3) Monitor the seepage at the toe of the spillway chute. Take appropriate action if any condition worsens.

(4) As part of the regular maintenance program, fill burrowing animal holes and remove trees growing near the embankment.

All designs and inspection of construction should be performed by a professional engineer experienced in the design and construction of dams.

In addition, the Owner should institute the following operational and maintenance procedures:

(1) Develop a detailed emergency operation and warning system for Whitney Lake Dam. When warnings of a major storm are given by the National Weather Service, the Owner should activate the emergency operation and warning system.

(2) During periods of unusually heavy rains, provide round-the-clock surveillance of the dam.

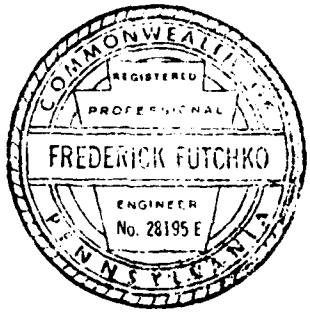
(3) Initiate an inspection program such that the dam is inspected on a regular basis. As presently required by the Commonwealth, the inspection program should include a formal annual inspection by a professional engineer experienced in the design and construction of dams. Utilize the inspection results to determine if remedial measures are necessary.

(4) Expand the existing maintenance program and develop a formal maintenance manual so that all features of the dam are properly maintained.

WHITNEY LAKE DAM

Submitted by:

GANNETT FLEMING CORDDRY
AND CARPENTER, INC.




FREDERICK FUTCHKO
Project Manager, Dam Section

Date: 18 June 1981

Approved by:

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, CORPS OF
ENGINEERS

JAMES W. PECK
Colonel, Corps of Engineers
Commander and District Engineer

Date: 24 JUNE 1981

WHITNEY LAKE DAM

Overview

WHITNEY LAKE DAM

NDI ID No. PA-00142; DER ID No. 64-133

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

SECTION 1

PROJECT INFORMATION

1.1 General.

a. Authority. The Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of inspection of dams throughout the United States.

b. Purpose. The purpose of the inspection is to determine if the dam constitutes a hazard to human life or property.

1.2 Description of Project.

a. Dam and Appurtenances. Whitney Lake Dam is a dry stone masonry dam with earthfill both upstream and downstream of the dry stone masonry. The topwidth and sideslopes of the embankment vary greatly. A corewall extends along the upstream side of the dry stone masonry. The corewall is timber, except for a 30-foot long concrete section of corewall at the spillway. The dam, including the spillway, is about 130 feet long and is 11.5 feet high.

The spillway is located near the right end of the dam. It is a broad-crested concrete weir that is 24.4 feet long. The spillway crest is about 1.6 feet below the top of the dam. Stoplogs that are 1-foot high extend across the spillway crest. A timber bridge supported by a 1-foot wide concrete pier spans the spillway.

The outlet works is a 15-inch diameter corrugated metal pipe (CMP) extending through the spillway weir. At present, the pipe is blocked at the upstream end and is not functional.

The various features of the dam are shown on the photographs in Appendix C and on the plates in Appendix E. A description of the geology is included in Appendix F.

b. Location. Whitney Lake Dam is located on Spinner Brook in Paupack Township, Wayne County, Pennsylvania. The dam is shown on USGS Quadrangle, Hawley, Pennsylvania, at latitude N 41° 27.8' and longitude W 75° 14.7'. The upstream end of the reservoir is shown on USGS Quadrangle, Lakeville, Pennsylvania. The dam is about 3.4 miles west of Hawley, Pennsylvania. A location map is shown on Plate E-1 in Appendix E.

c. Size Classification. Small (11.5 feet high, 570 acre-feet).

d. Hazard Classification. Downstream conditions indicate that a significant hazard classification is warranted for Whitney Lake Dam (Paragraphs 3.1e and 5.1c(5)).

e. Ownership. Whitney Lake Association, Dr. Charles Marston, President, P.O. Box 281, Hawley, PA 18428

f. Purpose of Dam. Recreation.

g. Design and Construction History. The dam was originally referred to as Degman's Pond Dam. It was a dry stone masonry dam with upstream earthfill that was constructed before 1934. There are no records for the dam prior to 1934. In 1934, Charles Houck, the owner of record, applied for a permit from the Commonwealth to reconstruct Degman's Pond Dam. At that time the dam was partially breached. The reconstruction consisted of replacing a 30-foot length of timber corewall with a 1-foot thick concrete corewall and constructing a spillway at this section. Photographs in the files, dated 1938, indicate that the reconstruction also consisted of placing earthfill on the downstream side of the dry stone masonry dam, providing concrete spillway side walls, and providing a stone masonry spillway chute. The photographs also reveal a rectangular opening at the toe of the spillway chute, which is surmised to be an outlet works.

Although the records indicate that no further modifications were made to the dam, observations during the inspection for this report revealed additional modifications have been made. The rectangular opening at the toe of the spillway chute has been covered with earthfill, the right spillway wall has been re-oriented, and a CMP has been constructed through the spillway weir. Additional earthfill has also been added at the downstream side to the left of the spillway.

Stoplogs have been placed on the spillway at various times. The Commonwealth has, on occasion, objected to these as they were not authorized by the construction permit.

h. Normal Operational Procedure. The reservoir is maintained at the top of the stoplogs. The Owner reports that the stoplogs are usually removed during the winter months. The existing outlet works is not functional.

1.3 Pertinent Data.

| | |
|---|---|
| a. Drainage Area. (square miles) | 1.0 |
| b. Discharge at Damsite. (cfs) | |
| Maximum known flood | Unknown |
| Outlet works at maximum pool elevation | Not Functional |
| Spillway capacity at maximum pool elevation (stoplogs in place) | 35 |
| (stoplogs removed) | 130 |
| c. Elevation. (feet above msl.) | |
| Top of dam | 1379.6 |
| Maximum pool | 1379.6 |
| Normal pool (low point on top of stoplogs) | 1379.0 |
| Spillway crest | 1378.0 |
| Upstream invert outlet works | Unknown |
| Downstream invert outlet works | 1375.8 |
| Streambed at toe of dam | 1368.1 |
| d. Reservoir Length. (miles) | |
| Spillway crest | 0.87 |
| Normal pool | 0.90 |
| Maximum pool | 0.91 |
| e. Storage. (acre-feet) | |
| Spillway crest | 350 |
| Normal pool | 476 |
| Maximum pool | 570 |
| f. Reservoir Surface. (acres) | |
| Spillway crest | 106 |
| Normal pool | 145 |
| Maximum pool | 170 |
| g. Dam. | |
| Type | Dry stone masonry with earthfill upstream and downstream of dry stone masonry |

| | | |
|---|---|---|
| g. | Dam. (cont'd.) | |
| | Length (feet) | 130, including spillway. |
| | Height (feet) | 11.5 |
| | Top Width (feet) | Varies; about 7 feet, minimum. |
| | Side Slopes<br>Upstream | Varies; steepest is about 1V on 3H. |
| | Downstream | Varies; steepest is about 1V on 1.25H. |
| | Zoning | Earthfill and dry stone masonry with corewall. |
| | Cutoff | Timber corewall except 30-foot long and 1-foot thick concrete corewall at spillway. |
| | Grout Curtain | None |
| h. | Diversion and Regulating Tunnel. | None (see Paragraph 1g). |
| i. | Spillway. | |
| | Type | Concrete broad-crested weir with stoplogs on crest. |
| | Length of Weir (feet) | 24.4 including 1-foot wide pier. |

| | | |
|---|---|---|
| i. | Spillway. (cont'd.) | |
| | Crest Elevation (feet above msl.) | 1378.0 |
| | Upstream Channel | Reservoir |
| | Downstream Channel | Paved stone masonry chute. |
| j. | Regulating Outlets. | One 15-inch diameter CMP. Upstream end is plugged and the facility is not functional. |

## SECTION 2

## ENGINEERING DATA

2.1 Design.

a. Data Available. Design information for Whitney Lake Dam includes:

(1) Sketches prepared in 1934 for proposed repairs and modifications to the dam.

(2) The subsequent analysis of the proposed repairs by the Commonwealth.

No design calculations are available.

b. Design Features. The project is described in Paragraph 1.2a. The various features of the dam are shown on the photographs in Appendix C and on Plates E-2 through E-4 in Appendix E.

c. Design Considerations. There is insufficient information to assess the design of the dam.

2.2 Construction.

a. Data Available. There is very little information concerning the original construction of the dam and subsequent modifications to it.

b. Construction Considerations. There are insufficient data to assess the construction of the dam.

2.3 Operation. There are no formal records of operation. Records of inspections performed by the Commonwealth are available for the period from 1935 to 1965. A summary of the inspection reports is included in Appendix A.

2.4 Evaluation.

a. Availability. Engineering data were provided by the Bureau of Dams and Waterway Management, Department of Environmental Resources, Commonwealth of Pennsylvania (PennDER). The Owner was available for information during the visual inspection, and provided soundings to determine the upstream slope.

b. Adequacy. The type and amount of available design and other engineering data are limited. The assessment of the dam is based on the combination of available data, visual inspection, performance history, hydrologic and hydraulic assumptions, and calculations developed for this report.

c. Validity. There is no reason to question the validity of the available data.

## SECTION 3

## VISUAL INSPECTION

### 3.1 Findings.

a. General. The overall appearance of the dam and appurtenant structures is fair. Deficiencies are described in the following paragraphs. The visual inspection checklist and sketch of the dam are presented in Appendix B. A profile of the top of the dam is included in Appendix B. Datum for the survey was assumed at the spillway crest, Elevation 1378.0, as determined from USGS mapping. On the day of the inspection, the reservoir pool was at the top of the stoplogs on the spillway crest.

b. Embankment. The embankment is in generally good condition. The embankment only extends for about 20 feet to the right of the spillway. It is barely distinguishable from the natural ground. To the left of the spillway the embankment is used as a parking area (Photograph A). The end of the dam is indistinct and blends with natural ground. Although some of the embankment is bare soil, no erosion was observed on it. The slope of the embankment near the left spillway wall is about 1V on 1.25H. The Owner stated that the Association had been placing fill in the area for some years. The Owner also stated that some trees had been removed from the embankment. Stumps of significant size were evident. At the downstream end of the left spillway wall, clear seepage estimated at 60 gpm was flowing from beneath rocks that were part of the recently placed fill (Photograph F). Minor items noted at the embankment include two small burrowing animal holes and trees growing near the embankment.

c. Appurtenant Structures. Overall, the spillway is in fair condition. A log trash boom extends across the spillway approach channel (Photograph C). The small, low spillway approach walls are cracked, tilted, and displaced. Stoplogs extend across the spillway crest. The top of the stoplogs is uneven. The concrete spillway walls act as abutments for the timber spillway bridge. The toe of the left spillway wall is deeply scoured. The stone masonry paving of the spillway chute is in relatively good condition, but the mortar of the stone masonry chute walls is severely deteriorated in places. A significant quantity of water was flowing from the spillway chute through the right spillway wall (Photograph D).

The outlet works is not functional. It appeared that the upstream end was blocked. No operating mechanism was evident. The Owner was unaware of its ever being used.

d. Reservoir Area. The watershed is mostly wooded. The only development is around the lake and adjacent to the one public road that extends through the watershed. As noted on Plate E-1, there is an error on the USGS mapping for the area. Two dams are shown as being upstream of Whitney Lake Dam. The dams are actually not in the watershed.

e. Downstream Conditions. Immediately downstream from Whitney Lake Dam is a small dam with a pool area less than one acre. The pool backs up to the end of the Whitney Lake spillway chute. Immediately downstream from the small dam, the stream passes through a 36-inch diameter CMP beneath a road. At the downstream edge of the road is a dwelling, the first floor of which is just slightly above the road. From this point the stream flows for about 1.9 miles to Lake Wallenpaupack. Along this reach are two very small dams and two road crossings. One of the roads is PA Route 590. All the dwellings along this reach are well above streambed. Since there is a probability of only a few lives being lost if the dam were to fail, a significant hazard classification is warranted for Whitney Lake Dam.

## SECTION 4

## OPERATIONAL PROCEDURES

4.1 Procedure. The reservoir is normally maintained at the top of the stoplogs on the spillway crest with excess inflows discharging over the spillway and into the downstream channel. The stoplogs are reportedly removed during the winter months.

4.2 Maintenance of Dam. There are no established procedures for maintenance of the dam. Maintenance work has generally been performed on an as-needed basis. Maintenance of the embankment is generally good, although the size of the stumps indicates that a more frequent brush cutting schedule is warranted. As noted in Section 3, there are maintenance deficiencies at the spillway. Although the dam is checked periodically by the Owner, no formal reports are maintained.

4.3 Maintenance of Operating Facilities. The outlet works facilities are not functional.

4.4 Warning Systems in Effect. There is no emergency operation and warning system for the dam. The Owner stated that if advance warning of a major storm were received, the stoplogs would be removed.

4.5 Evaluation of Operational Adequacy. Although some maintenance is performed, the current program could be improved. Since intense floods can occur over small watersheds with little warning, removal of the stoplogs during floods is an unreliable means of increasing spillway capacity. Inspections are necessary to detect hazardous conditions at the dam. An emergency operation and warning system is necessary to reduce the risk of dam failure should adverse conditions develop and to prevent loss of life should the dam fail.

## SECTION 5

## HYDROLOGY AND HYDRAULICS

5.1 Evaluation of Features.

a. Design Data. There are no hydrologic or hydraulic design calculations available for Whitney Lake Dam.

b. Experience Data. The Owner believes the flood of record occurred during Tropical Storm Diane in 1955. There are no data to estimate the flow at the dam during this storm. Since the reconstruction of the dam in 1934, there are no records of it being overtopped.

c. Visual Observations.

(1) General. The visual inspection of Whitney Lake Dam, which is described in Section 3, resulted in a number of observations relevant to hydrology and hydraulics.

(2) Embankment. The top of the embankment is somewhat uneven. The records indicate that the top of embankment for the 1934 modifications was 1.5 feet above the spillway crest. The embankment is presently a minimum of 1.6 feet above spillway crest. However, the stoplogs reduce the available head to 0.6 foot.

(3) Appurtenant Structures. The log trash boom could significantly reduce the discharge capacity of the spillway. The reduction would be more severe if debris collected against the barrier. The stoplogs are not level. In the analysis described hereafter, it has been assumed that the log trash barrier has no effect and that the top of the stoplogs is both level and at its lowest elevation. Both these assumptions increase the spillway capacity. As shown on the spillway profile in Appendix B, the spillway chute walls are quite low at some places. Overtopping of the walls could occur during floods. Since the outlet works is not operational. there are no means at present of drawing down the pool in case of emergency.

(4) Reservoir Area. No conditions were observed in the reservoir area or watershed that might present a hazard to the dam.

(5) Downstream Conditions. If the dam were to fail, one dwelling would be flooded. In addition 3 small dams would probably be overtopped and possibly fail. The failure of these dams would not contribute to the downstream hazards. The failure could also cause erosion damage at 3 roads, one of which is a major route. Downstream conditions indicate that a significant hazard classification is warranted for Whitney Lake Dam.

d. Overtopping Potential.

(1) Spillway Design Flood. According to the criteria established by the Office of the Chief of Engineers (OCE), the Spillway Design Flood (SDF) for the size (small) and hazard potential (significant) of Whitney Lake Dam is between the 100-year flood and one-half of the Probable Maximum Flood (PMF). Because there is a possibility of loss or life if the dam were to fail, the 1/2 PMF was selected as the SDF. The 100-year peak flood inflow to Whitney Lake was determined by a regionalized method referenced in Appendix D.

(2) Summary of Results. The analysis in Appendix D indicates that the spillway capacity of the dam is about 35 cfs with the stoplogs in place and about 130 cfs if the stoplogs were removed. The 100-year peak flood inflow was computed to be 590 cfs. There is a possibility of the dam being overtopped by relatively frequent floods.

(3) Spillway Adequacy. The criteria used to evaluate the spillway adequacy of a dam are described in Appendix D. Since the spillway capacity of the dam is less than the 100-year flood, the spillway capacity is rated as inadequate.

## SECTION 6

## STRUCTURAL STABILITY

### 6.1 Evaluation of Structural Stability.

a. Visual Observations.

(1) General. The visual inspection of Whitney Lake Dam, which is described in Section 3, resulted in a number of observations relevant to structural stability. These observations are evaluated herein for the various features.

(2) Embankment. Although the embankment slope adjacent to the left spillway wall is relatively steep, it is not high. The embankment slope in other areas varies but is quite flat. The only concern for the structural integrity of the embankment is the seepage from the embankment at the toe of the spillway chute. During the visual inspection, it appeared possible that water could be flowing through the scoured area of the spillway wall near the spillway crest and behind the wall to the seepage area. As noted in Paragraph 1g, the seepage area is also near what could have been an outlet works tunnel. Incomplete closure of the tunnel could be a cause of the seepage. Visual monitoring of the seepage is warranted, since increases in quantity or the appearance of turbidity could indicate a hazard to the dam. The other deficiencies noted in Section 3 are minor maintenance deficiencies; if they are not corrected, they could develop into hazards to the dam.

(3) Appurtenant Structures. The condition of the concrete and stone masonry at the spillway indicates both a lack of maintenance and the need for repairs. No structural deficiencies were observed at the outlet works.

b. Design and Construction Data. No calculations of embankment or spillway stability are available. However, nothing in the records indicates any concern for the stability of these structures.

c. Operating Records. There are no operating records maintained for Whitney Lake Dam and Reservoir. Since the 1934 modifications, there is no record of any stability problems at the dam.

d. Post-construction Changes. The modifications listed previously do not appear to adversely affect the structural stability of the dam.

e. Seismic Stability. Whitney Lake Dam is located in Seismic Zone 1, where earthquake loadings are not considered to be significant for small dams with no readily apparent stability problems. Since no readily apparent stability problems were observed, the seismic stability of the dam is considered to be adequate.

# SECTION 7

# ASSESSMENT, RECOMMENDATIONS, AND PROPOSED REMEDIAL MEASURES

## 7.1 Dam Assessment.

a. Safety.

(1) Based on criteria established for these studies, Whitney Lake Dam is judged to be in fair condition. The recommended Spillway Design Flood (SDF) for the size and hazard classification of the dam varies between the 100-year flood and the 1/2 PMF. The 1/2 PMF was selected as the SDF. The existing spillway will not pass the 100-year peak flood inflow. If the stoplogs on the spillway crest were removed, the spillway capacity would increase significantly but it would still be insufficient to pass the 100-year peak flood inflow. The spillway capacity is rated as inadequate.

(2) Several deficiencies were observed at the dam. The most serious deficiency is the structural deterioration of the spillway.

(3) Although some maintenance has been performed, the existing maintenance program could be upgraded.

(4) A summary of the features and observed deficiencies is as follows:

| Feature | Observed Deficiency |
|---|---|
| Embankment | Seepage at toe; trees growing near embankment; burrowing animal holes. |
| Spillway | Deteriorated concrete and stone masonry; scour. |
| Outlet Works | Not functional. |

b. Adequacy of Information. The information available is such that an assessment of the condition of the dam can be inferred from the combination of available data, visual inspection, past performance, and computations performed as part of this study.

c. Urgency. The recommendations in Paragraph 7.2 should be implemented without delay.

d. Necessity for Further Investigations. In order to accomplish the remedial measures outlined in Paragraph 7.2, further investigations by the Owner will be required.

7.2 Recommendations and Remedial Measures.

a. The following remedial measures, listed in approximate order of priority, are recommended to be undertaken by the Owner without delay:

(1) Design and construct a spillway capable of passing a minimum of the 100-year flood. Before this work is accomplished, remove the trash barrier and stoplogs at the spillway so that the spillway capacity is increased during the design period.

(2) Develop a method for drawing down the reservoir in case of an emergency. If a pipe is placed through the embankment, it should be provided with an upstream closure facility.

(3) Monitor the seepage at the toe of the spillway chute. Take appropriate action if the seepage condition worsens.

(4) As part of the regular maintenance program, fill burrowing animal holes and remove trees growing near the embankment.

All designs and inspection of construction should be performed by a professional engineer experienced in the design and construction of dams.

b. In addition, the Owner should institute the following operational and maintenance procedures:

(1) Develop a detailed emergency operation and warning system for Whitney Lake Dam. When warnings of a major storm are given by the National Weather Service, the Owner should activate the emergency operation and warning system.

(2) During periods of unusually heavy rains, provide round-the-clock surveillance of the dam.

(3) Initiate an inspection program such that the dam is inspected on a regular basis. As presently required by the Commonwealth, the inspection program should include a formal annual inspection by a professional engineer experienced in the design and construction of dams. Utilize the inspection results to determine if remedial measures are necessary.

(4) Expand the existing maintenance program and develop a formal maintenance manual so that all features of the dam are properly maintained.

# APPENDIX A

## CHECKLIST - ENGINEERING DATA

CHECKLIST

ENGINEERING DATA

DESIGN, CONSTRUCTION, AND OPERATION
PHASE I

NAME OF DAM: Whitney Lake Dam

NDI ID NO.: PA-00142 DER ID NO.: 64-133



| ITEM | REMARKS |
|---|---|
| AS-BUILT DRAWINGS | None. Design sketches for 1934 modification shown on Plates E-3 and E-4. |
| REGIONAL VICINITY MAP | See Plate F-1 |
| CONSTRUCTION HISTORY | Built Prior 1934. Modified 1934. Subsequent modifications not noted in records. |
| TYPICAL SECTIONS OF DAM | None |
| OUTLETS:<br>Plan<br>Details<br>Constraints<br>Discharge Ratings | No plans of dam.<br>No [illegible] outlet works. |

A-1

ENGINEERING DATA



| ITEM | REMARKS |
|---|---|
| RAINFALL/RESERVOIR RECORDS | None |
| DESIGN REPORTS | Analysis of 1934 modification by The Commonwealth |
| GEOLOGY REPORTS | None |
| DESIGN COMPUTATIONS:<br>Hydrology and Hydraulics<br>Dam Stability<br>Seepage Studies | None |
| MATERIALS INVESTIGATIONS:<br>Boring Records<br>Laboratory<br>Field | None |
| POSTCONSTRUCTION SURVEYS OF DAM | None |

ENGINEERING DATA



| ITEM | REMARKS |
|---|---|
| BORROW SOURCES | Unknown |
| MONITORING SYSTEMS | None. |
| MODIFICATIONS | See Construction History |
| HIGH POOL RECORDS | None |
| POSTCONSTRUCTION ENGINEERING STUDIES AND REPORTS | None |
| PRIOR ACCIDENTS OR FAILURE OF DAM:<br>Description<br>Reports | None prior to modification |

ENGINEERING DATA



| ITEM | REMARKS |
|---|---|
| MAINTENANCE AND OPERATION RECORDS | NONE. THE WHITNEY LAKE ASSOCIATION MAINTAINS MINUTES OF MEETINGS |
| SPILLWAY:<br>Plan<br>Sections<br>Details | SEE PLATES E-2 TO E-4 |
| OPERATING EQUIPMENT:<br>Plans<br>Details | NONE |
| PREVIOUS INSPECTIONS<br>Dates By The Commonwealth<br>Deficiencies | 1957 - "ABOUT HALF OF THE SPILLWAY FLOWS THROUGH THE STRUCTURE IN THE OLD CREEK CHANNEL". 10" FLASHBOARDS ON 3 BAYS. (ORIGINAL REMOVED BY COMMONWEALTH).<br>1988 - FAIRLY GOOD CONDITION, 8" FLASHBOARDS AND TIER CENTERS OF SPILLWAY.<br>1965 - NO DEFICIENCIES (PHOTOGRAPHS SHOW STOPLOGS ON SPILLWAY). |
| | THIS PAGE IS BEST QUALITY PRACTICABLE<br>FROM COPY FURNISHED TO DDC |

# APPENDIX B

## CHECKLIST - VISUAL INSPECTION

CHECKLIST

VISUAL INSPECTION

PHASE I

Name of Dam: WHITNEY LAKE County: WAYNE State: PENNSYLVANIA

NDI ID No.: PA-00142 DER ID No.: 64-133

Type of Dam: DRY MASONRY WITH EARTHFILL Hazard Category: SIGNIFICANT

Date(s) Inspection: 13 APRIL 1981 Weather: CLOUDY Temperature: 60's °F

SOIL CONDITIONS: MOIST - DRY

Pool Elevation at Time of Inspection: 1379.0 msl/Tailwater at Time of Inspection: 1368.1 msl

Inspection Personnel:

DR. CHARLES NIEDZWIECKI (WLA) D. WOLF (GFCC)

GERALD J. RICHARD (WLA) D. EBERSOLE (GFCC)

MERLE LICHTENBERG (WLA)

A. WHITMAN (GFCC) Recorder

B-1

## EMBANKMENT

Sheet 1 of 2

| VISUAL EXAMINATION OF | OBSERVATIONS | REMARKS OR RECOMMENDATIONS |
|---|---|---|
| SURFACE CRACKS | NONE | |
| UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE | NONE | |
| SLOUGHING OR EROSION:<br>Embankment Slopes<br>Abutment Slopes | NONE. TWO SMALL BURROWING ANIMAL HOLES NOTED | |
| CREST ALIGNMENT:<br>Vertical<br>Horizontal | HORIZONTAL - NO DEFICIENCIES<br>VERTICAL - SEE PROFILE AT END OF INSPECTION REPORT | |
| RIPRAP FAILURES | NONE | |

B-2

## EMBANKMENT

Sheet 2 of 2

| VISUAL EXAMINATION OF | OBSERVATIONS | REMARKS OR RECOMMENDATIONS |
|---|---|---|
| JUNCTION OF EMBANKMENT WITH:<br>Abutment<br>Spillway<br>Other Features | No deficiencies | |
| ANY NOTICEABLE SEEPAGE | 60 gpm +/-<br>FROM EMBANKMENT AT TOE OF LEFT SPILLWAY CHUTE WALL | |
| STAFF GAGE AND RECORDER | None at Site | |
| DRAINS | None at Site | |
| Vegetation | Some immature trees growing close to embankment and spillway. | |

## OUTLET WORKS

Sheet 1 of 1

| VISUAL EXAMINATION OF | OBSERVATIONS | REMARKS OR RECOMMENDATIONS |
|---|---|---|
| CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT | 15" DIA CMP CONSTRUCTED THROUGH SPILLWAY WEIR. | |
| INTAKE STRUCTURE | NONE EVIDENT. | PIPE IS BLOCKED AT UPSTREAM END AND IS NOT FUNCTIONAL. |
| OUTLET STRUCTURE | FREE OUTFALL | |
| OUTLET CHANNEL | SPILLWAY CHUTE | |
| EMERGENCY GATE | NONE AT SITE | |

B-4

## UNGATED SPILLWAY

Sheet 1 of 1

| VISUAL EXAMINATION OF | OBSERVATIONS | REMARKS OR RECOMMENDATIONS |
|---|---|---|
| CONCRETE WEIR | Obscured by flow, no deficiencies observed. | 1'+ stoplogs on crest. |
| APPROACH CHANNEL | Log trash [illegible] just upstream of crest. See spillway profile following inspection forms. | Approach walls cracked, tilted, and displaced |
| DISCHARGE CHANNEL | Stone masonry chute. Scour at end. Walls and [illegible] in good condition in some areas with water flowing through them. | |
| BRIDGE AND PIERS | Generally good condition except cliff spillway wall scoured severely at toe. | |
| | | |

B-5

## INSTRUMENTATION

Sheet 1 of 1

| VISUAL EXAMINATION OF | OBSERVATIONS | REMARKS OR RECOMMENDATIONS |
|---|---|---|
| MONUMENTATION/SURVEYS | NONE AT SITE | |
| OBSERVATION WELLS | | |
| WEIRS | | |
| PIEZOMETERS | | |
| OTHER | NONE AT SITE | |

B-6

## DOWNSTREAM CHANNEL

Sheet 1 of 1

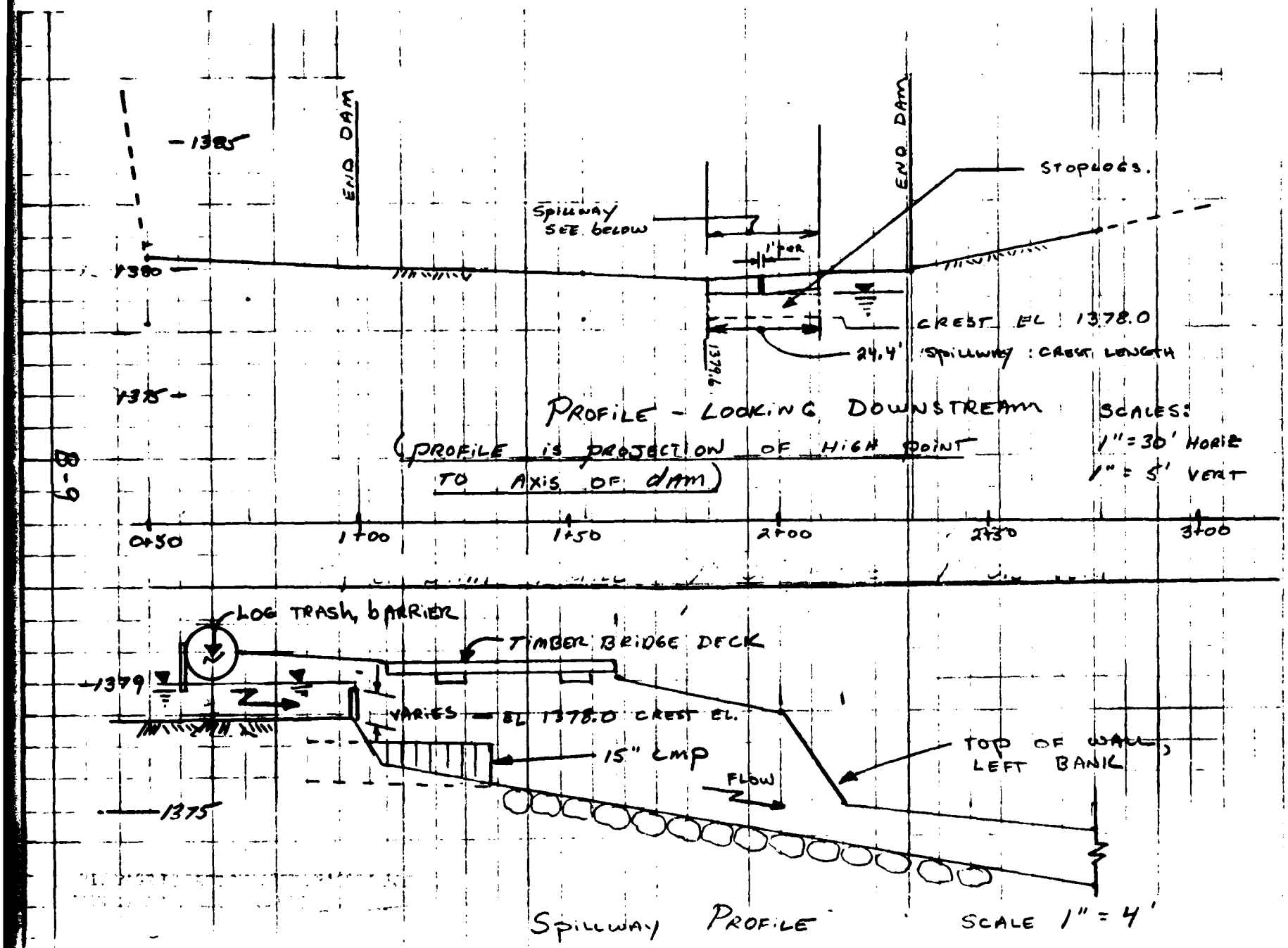
| VISUAL EXAMINATION OF | OBSERVATIONS | REMARKS OR RECOMMENDATIONS |
|---|---|---|
| **CONDITION:**<br>**Obstructions**<br>**Debris**<br>**Other** | CLEAR AT PRESENT TIME FROM DOWNSTREAM DAM LOOKS UP ABOUT 200' OR SO. | |
| **SLOPES** | RELATIVELY MILD. | |
| **APPROXIMATE NUMBER OF HOMES AND POPULATION** | 1 DWELLING ABOUT 500' DOWNSTREAM | 3 ROAD CROSSINGS AND 3 SMALL DAMS NEAR DOWNSTREAM |
| | | |
| | | |

B-7

## RESERVOIR AND WATERSHED

Sheet 1 of 1

| VISUAL EXAMINATION OF | OBSERVATIONS | REMARKS OR RECOMMENDATIONS |
|---|---|---|
| SLOPES | Relatively mild with some swamps. | |
| SEDIMENTATION | No observed or Reported problems | |
| WATERSHED DESCRIPTION | Mostly forested Minor rural development | Farms on USGS mapping, see Plate E-1. |
| | | |
| | | |




B-9

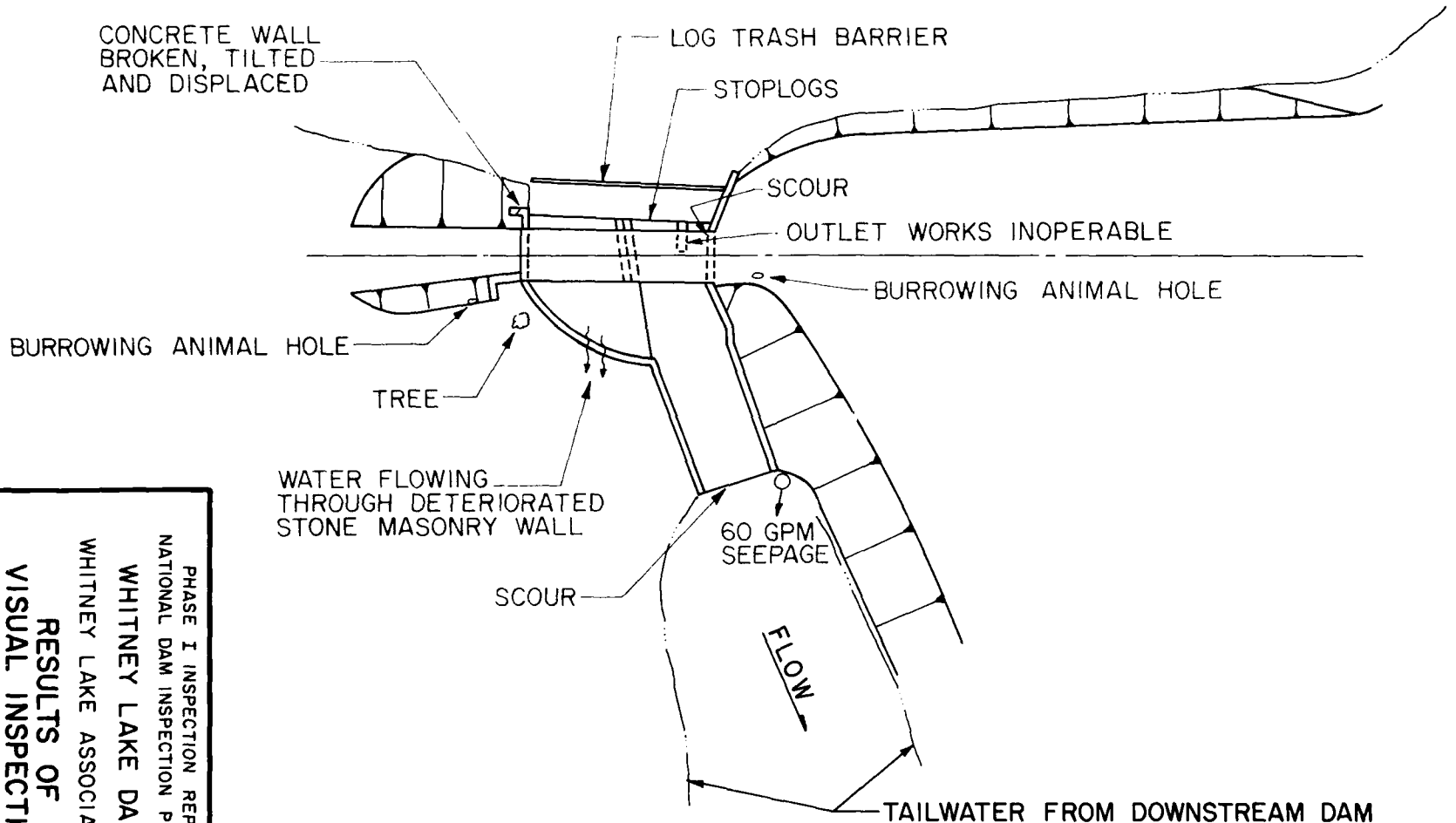
BY _____ DATE _____
CHKD BY _____ DATE _____

SUBJECT Lake Whitney Dam

SHEET NO _____ OF _____
JOB NO _____

LAKE WHITNEY

DATE OF INSPECTION: 13 APRIL 81
POOL ELEVATION: 1379.0




NOT TO SCALE

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

**WHITNEY LAKE DAM**

WHITNEY LAKE ASSOCIATION

**RESULTS OF VISUAL INSPECTION**

MAY 1981

EXHIBIT B-1

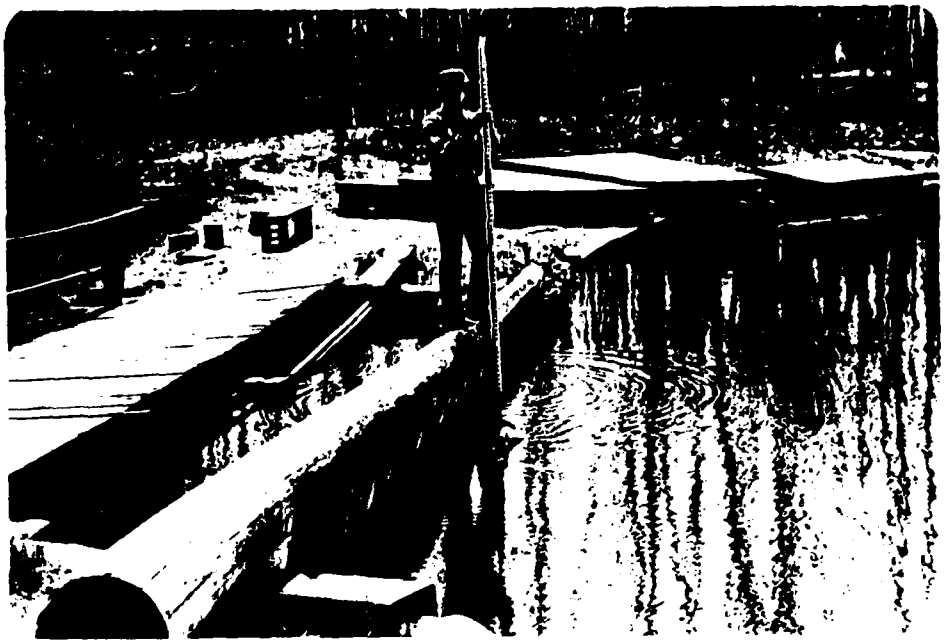
# APPENDIX C

## PHOTOGRAPHS

WHITNEY LAKE DAM

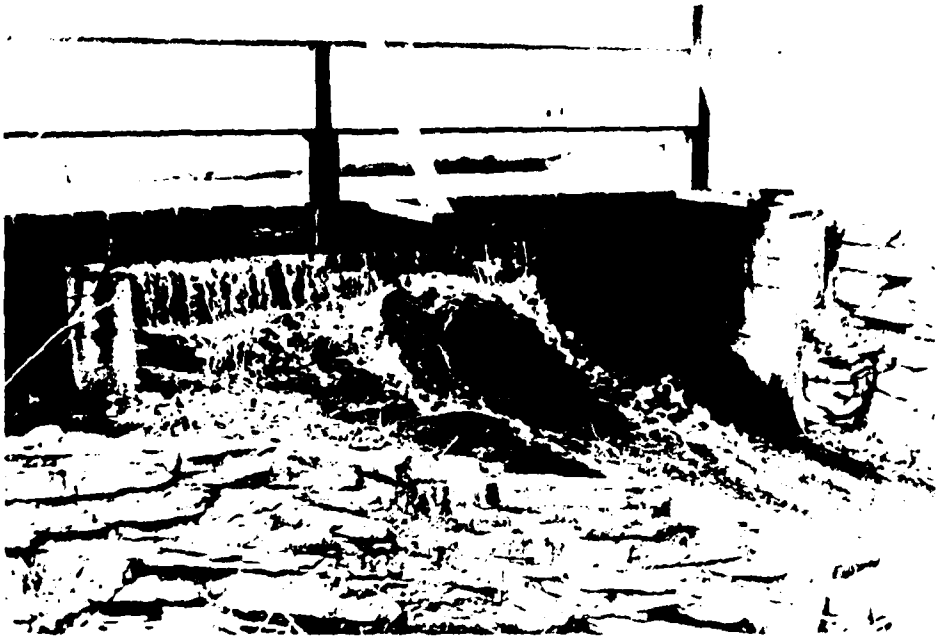
A. Embankment - View From Left Abutment

B. Upstream Slope

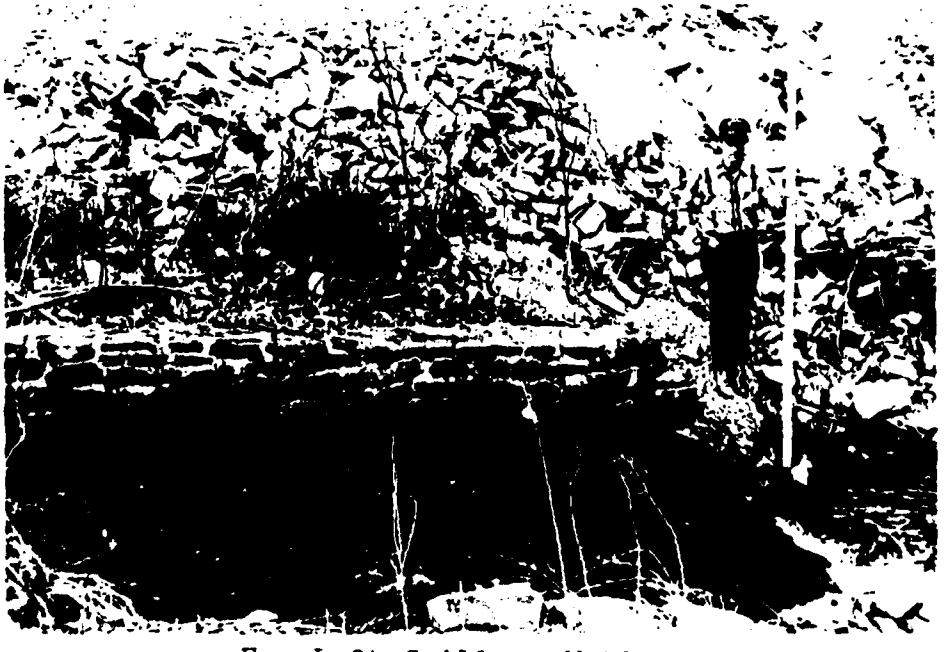


C. Spillway Approach

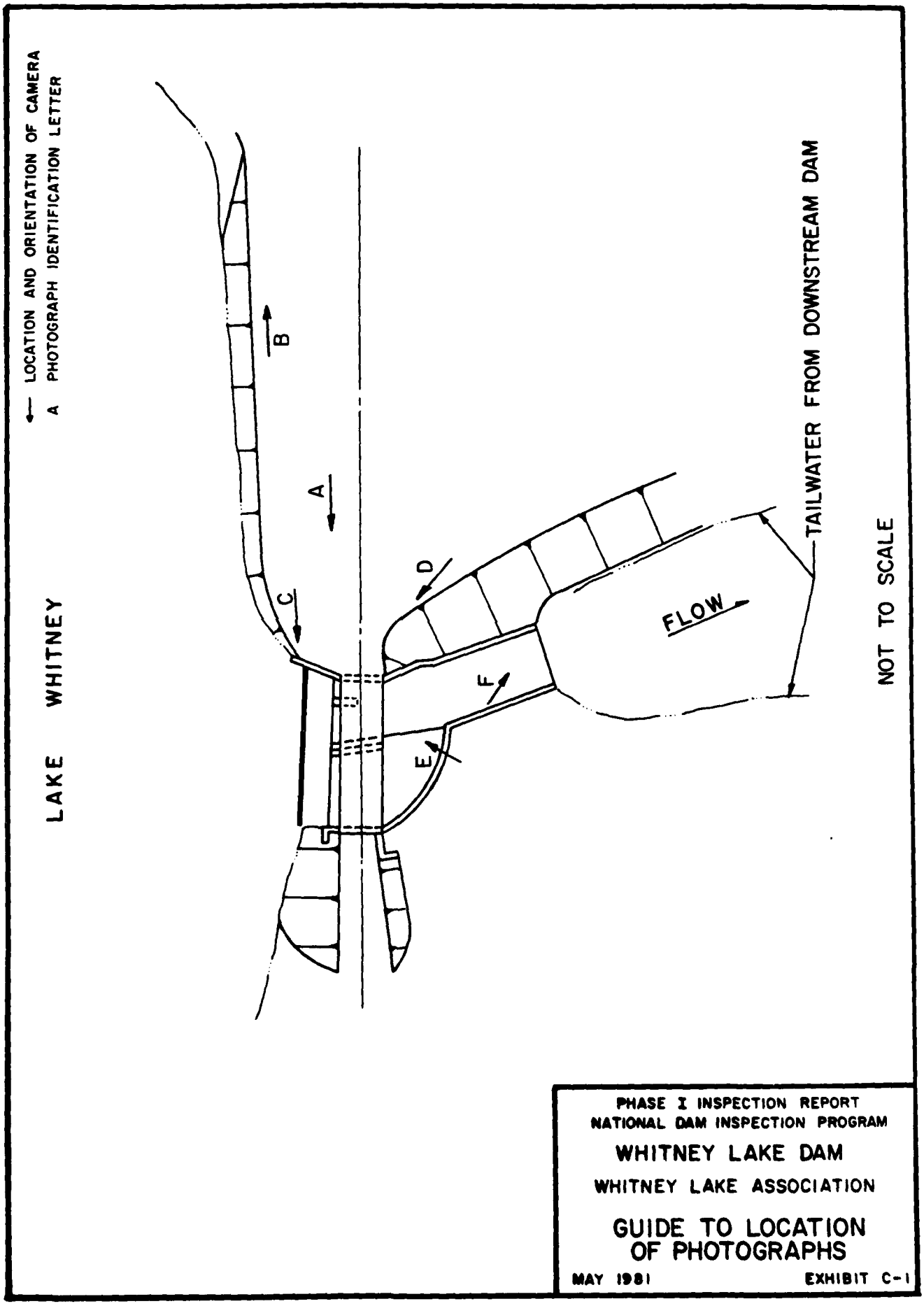
D. Spillway



E. Outlet Works



F. Left Spillway Wall




PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

WHITNEY LAKE DAM

WHITNEY LAKE ASSOCIATION

GUIDE TO LOCATION OF PHOTOGRAPHS

MAY 1981 EXHIBIT C-1

# APPENDIX D

# HYDROLOGY AND HYDRAULICS

# APPENDIX D

## HYDROLOGY AND HYDRAULICS

Spillway Capacity Rating:

In the recommended Guidelines for Safety Inspection of Dams, the Department of the Army, Office of the Chief of Engineers (OCE), established criteria for rating the capacity of spillways. The recommended Spillway Design Flood (SDF) for the size (small, intermediate, or large) and hazard potential (low, significant, or high) classification of a dam is selected in accordance with the criteria. The SDF for those dams in the high hazard category varies between one-half of the Probable Maximum Flood (PMF) and the PMF. If the dam and spillway are not capable of passing the SDF without overtopping failure, the spillway capacity is rated as inadequate. If the dam and spillway are capable of passing one-half of the PMF without overtopping failure, or if the dam is not in the high hazard category, the spillway capacity is not rated as seriously inadequate. A spillway capacity is rated as seriously inadequate if all of the following conditions exist:

(a) There is a high hazard to loss of life from large flows downstream of the dam.

(b) Dam failure resulting from overtopping would significantly increase the hazard to loss of life downstream from the dam from that which would exist just before overtopping failure.

(c) The dam and spillway are not capable of passing one-half of the PMF without overtopping failure.

APPENDIX D

DELAWARE River Basin
Name of Stream: SPINNERS BROOK
Name of Dam: WHITNEY LAKE
NDI ID No.: PA-00142
DER ID No.: 64-133
Latitude: N 41° 27.8' Longitude: W 75° 14.7'
Top of Dam Elevation: 1379.6
Streambed Elevation: 1368.1 Height of Dam: 11.5 ft
Reservoir Storage at Top of Dam Elevation: 170 acre-ft
Size Category: SMALL
Hazard Category: SIGNIFICANT (see Section 5)
Spillway Design Flood: VARIES 100-YEAR TO ½ PMF
PMF = PROBABLE MAXIMUM FLOOD

UPSTREAM DAMS

| Name | Distance from Dam (miles) | Height (ft) | Storage at top of Dam Elevation (acre-ft) | Remarks |
|---|---|---|---|---|
| NONE | AS NOTED ON PLATE E-1, THE | | | |
| | TWO "UPSTREAM" DAMS DO | | | |
| | NOT DRAIN INTO WHITNEY LAKE | | | |
| | | | | |

DOWNSTREAM DAMS

| | | | | |
|---|---|---|---|---|
| 3 VERY SMALL DAMS SIMILAR | | | | |
| TO "FARM PONDS". THESE ARE OF | | | | |
| NO SIGNIFICANCE TO THE ANALYSIS. | | | | |
| LAKE WALLENPAUPACK | 1.9 (TO LAKE) | 66 | 214,800 | DER ID 52-51 5760 ACRE POOL |

Name of Dam: WHITNEY LAKE DAM

STORAGE DATA:

| Elevation | | Area (acres) | | Storage million gals | Storage acre-ft | | Remarks |
|---|---|---|---|---|---|---|---|
| 1368.1 | =ELEVO | 0 | | 0 | 0 | | STREAMBED AT TOE |
| 1378.0 | =ELEV1 | 106 | =A1 | | 350 | =S1* | USGS AREA |
| 1379.0 | | 145 | † | | 476 | | TOP STOPLOGS +/- |
| 1379.6 | | 170 | † | | 570 | | TOP DAM |
| 1380.0 | | 189.0 | | | 642 | | USGS |
| 1381.0 | | 196 | † | | 835 | | |
| 1382.0 | | 204 | † | | 1035 | | |
| | | | | | | | |
| 1400 | | 362.0 | | | | | USGS |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

* S1 = A1 × (ELEV1 − ELEVO)/3 † INTERPOLATED

** Planimetered contour at least 10 feet above top of dam

Reservoir Area at Normal Pool is 22 percent of watershed.

BREACH DATA: NOT USED

See Appendix B for sections and existing profile of the dam.

Soil Type from Visual Inspection: _____

Maximum Permissible Velocity (Plate 28, EM 1110-2-1601) _____ fps
(from $Q = CLH^{3/2} = V \cdot A$ and depth = (2/3) x H) & A = L·depth

HMAX = $(4/9\ V^2/C^2)$ = _____ ft., C = ____ Top of Dam El.= ____

HMAX + Top of Dam El. = _____ = FAILEL
(Above is elevation at which failure would start)

Dam Breach Data:

BRWID = _____ ft (width of bottom of breach)
Z = _____ (side slopes of breach)
ELBM = _____ (bottom of breach elevation, minimum of zero storage elevation)
WSEL = _____ (normal pool elevation)
T FAIL = _____ mins = _____ hrs (time for breach to develop)

BY _____ DATE 5/81 SUBJECT _____ SHEET NO. _____ OF _____
CHKD BY DAW DATE 5/81 JOB NO _____

# WHITNEY LAKE DAM

## DETERMINATION OF 100-YEAR FLOOD

FROM

"REGIONAL FREQUENCY STUDY, UPPER DELAWARE AND HUDSON RIVER BASINS, NEW YORK DISTRICT"
NOVEMBER 1974
NEW YORK DISTRICT
CORPS OF ENGINEERS

DA = DRAINAGE AREA = 1.01 $mi^2$
Log = LOGARITHM
$Q_m$ = MEAN ANNUAL PEAK FLOW (CFS)
$C_m$ = COEFFICIENT OF MEAN FLOW
S = STANDARD DEVIATION
$C_s$ = COEFFICIENT OF STANDARD DEVIATION
g = SKEW COEFFICIENT
$K(P,g)$ = PEARSON TYPE III STANDARD DEVIATE FOR P (PROBABILITY OF OCCURRENCE = 100 YEAR = .01)
$C_m$, $C_s$, AND g FROM REGIONALIZED DATA GIVEN IN REFERENCED REPORT

$$\text{Log}(Q_m) = C_m + 0.87 \text{ Log}(DA)$$
$$S = C_s - 0.05 \text{ Log}(DA)$$
$$\text{Log}(Q_p) = \text{Log}(Q_m) + K(P,g) \times S$$

$C_m = 1.75$ $C_s = 0.37$ $g = 0.57$
$K(1\%, 0.57) = 2.75$

$\text{Log}(Q_m) = 1.75 + 0.87 \text{ Log}(1.01) = 1.754$,
$S = 0.3698$
$\text{Log}(Q_{1\%}) = 1.754 + 2.75 \times 0.3698 = 2.77$

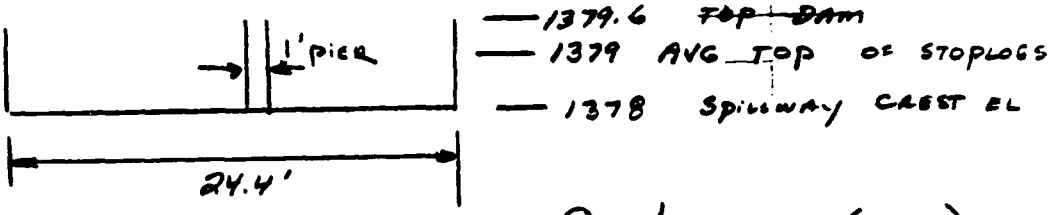
$Q_{1\%}$ = 100 YEAR FLOOD = 590 CFS

BY _____ DATE _____ SUBJECT _____ SHEET NO. _____ OF _____

CHKD BY _____ DATE _____ JOB NO _____

# WHITNEY LAKE DAM

## Spillway Capacity




$Q = CLH^{1.5}$

Q = discharge (cfs)

L = effective length = 24.4' − 1' = 23.4'

C = discharge coefficient

= 3.1 for stoplogs

= 2.7 (broad crested weir) for spillway crest

H = head

with stoplogs:

$Q = 3.1 \times 23.4 \times (1379.6 - 1379)^{1.5} = 34$ cfs

$\approx 35$ cfs

without stoplogs:

$Q = 2.7 \times 23.4 \times (1379.6 - 1378)^{1.5} = 128$ cfs

$\approx 130$ cfs

Ignores effect of trash barrier; this effect could be significant and would reduce the capacity.

If top of dam at EL. 1379.8

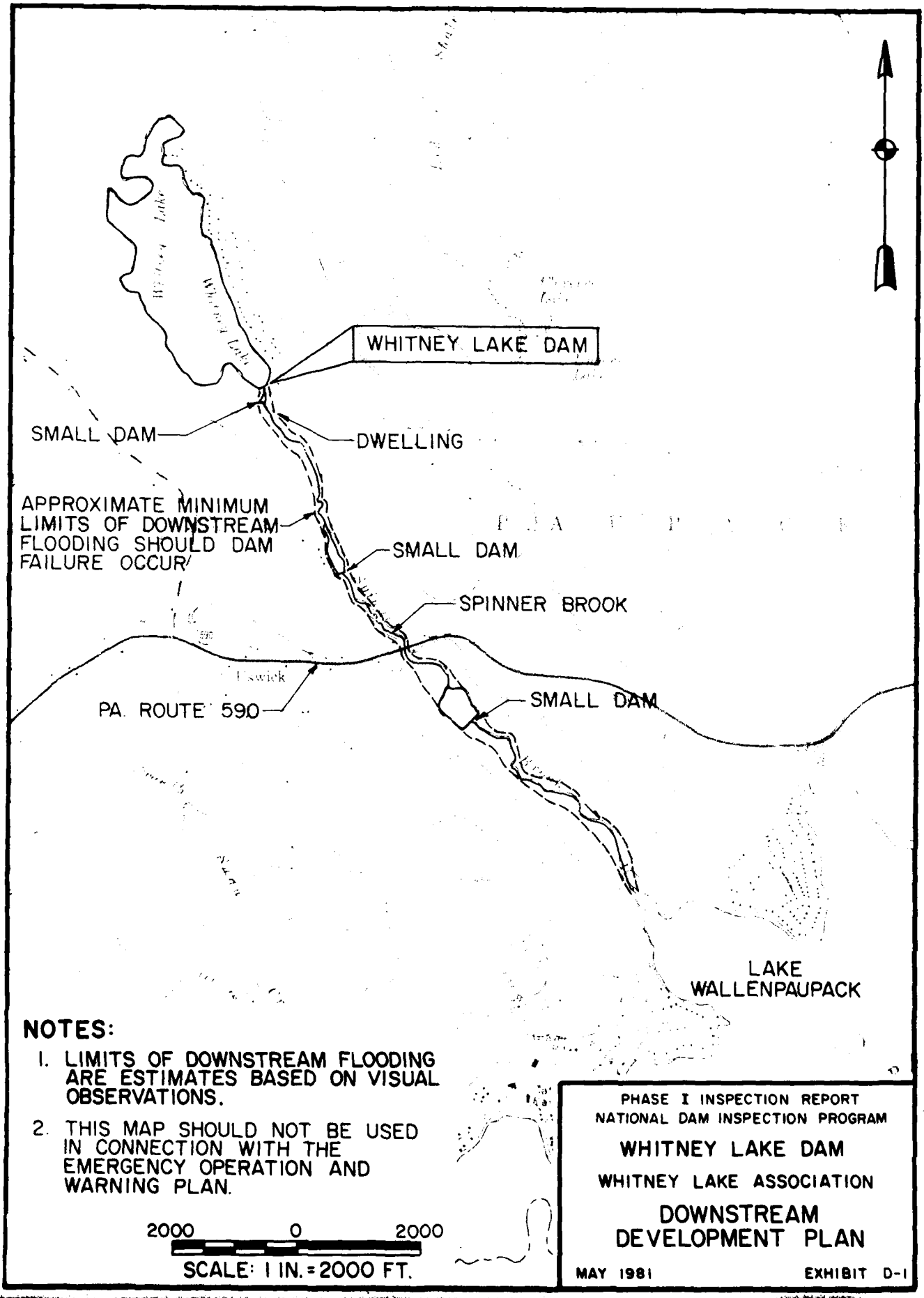
$Q = 2.7 \times 23.4 (1379.8 - 1378)^{1.5} = 153$ cfs

Conclusion:

$\therefore$ 34 cfs $<$ 590 cfs

130 cfs $<$ 590 cfs

$\therefore$ spillway capacity inadequate




**NOTES:**

1. LIMITS OF DOWNSTREAM FLOODING ARE ESTIMATES BASED ON VISUAL OBSERVATIONS.
2. THIS MAP SHOULD NOT BE USED IN CONNECTION WITH THE EMERGENCY OPERATION AND WARNING PLAN.

2000 0 2000

SCALE: 1 IN. = 2000 FT.

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

# WHITNEY LAKE DAM

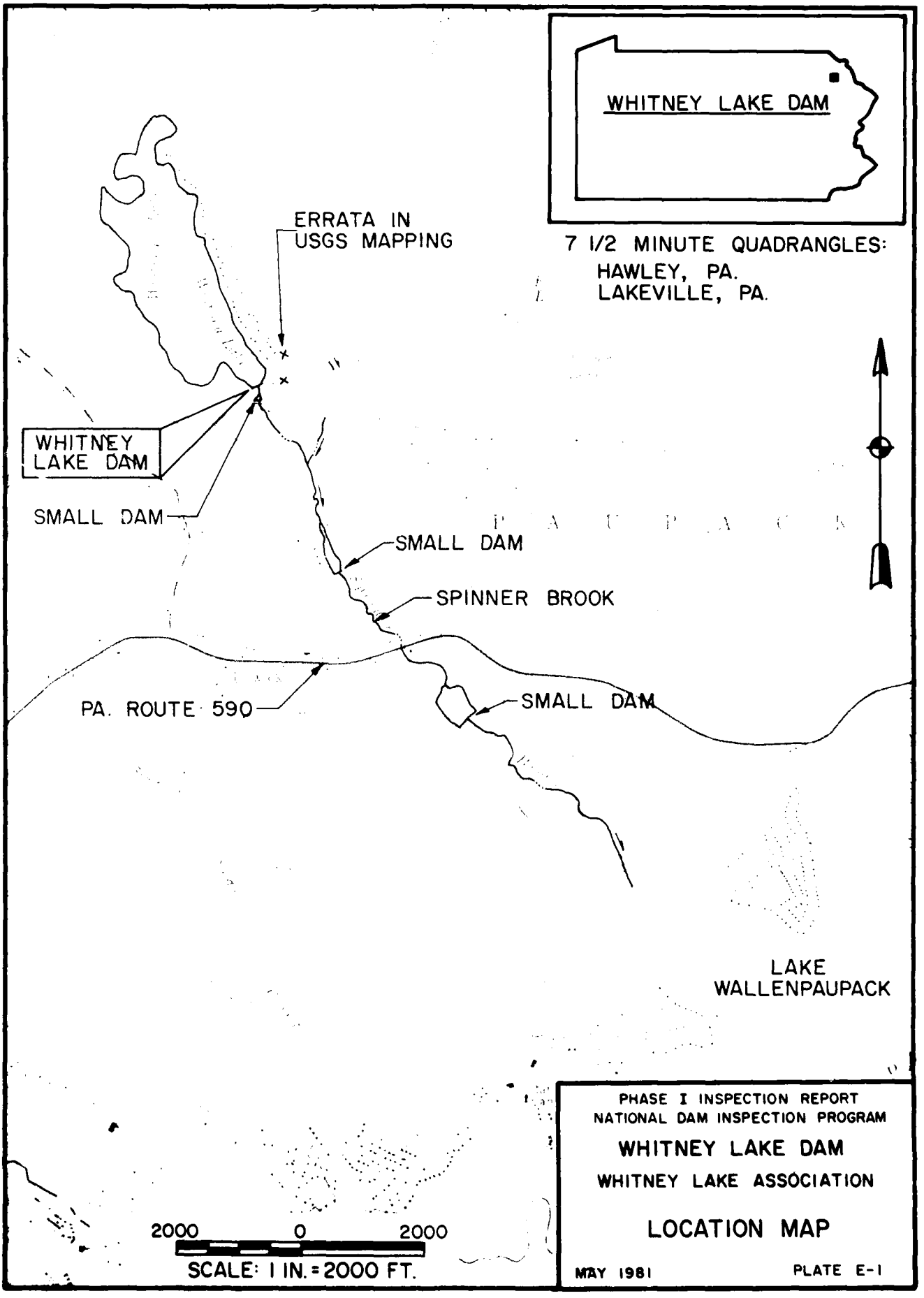
WHITNEY LAKE ASSOCIATION

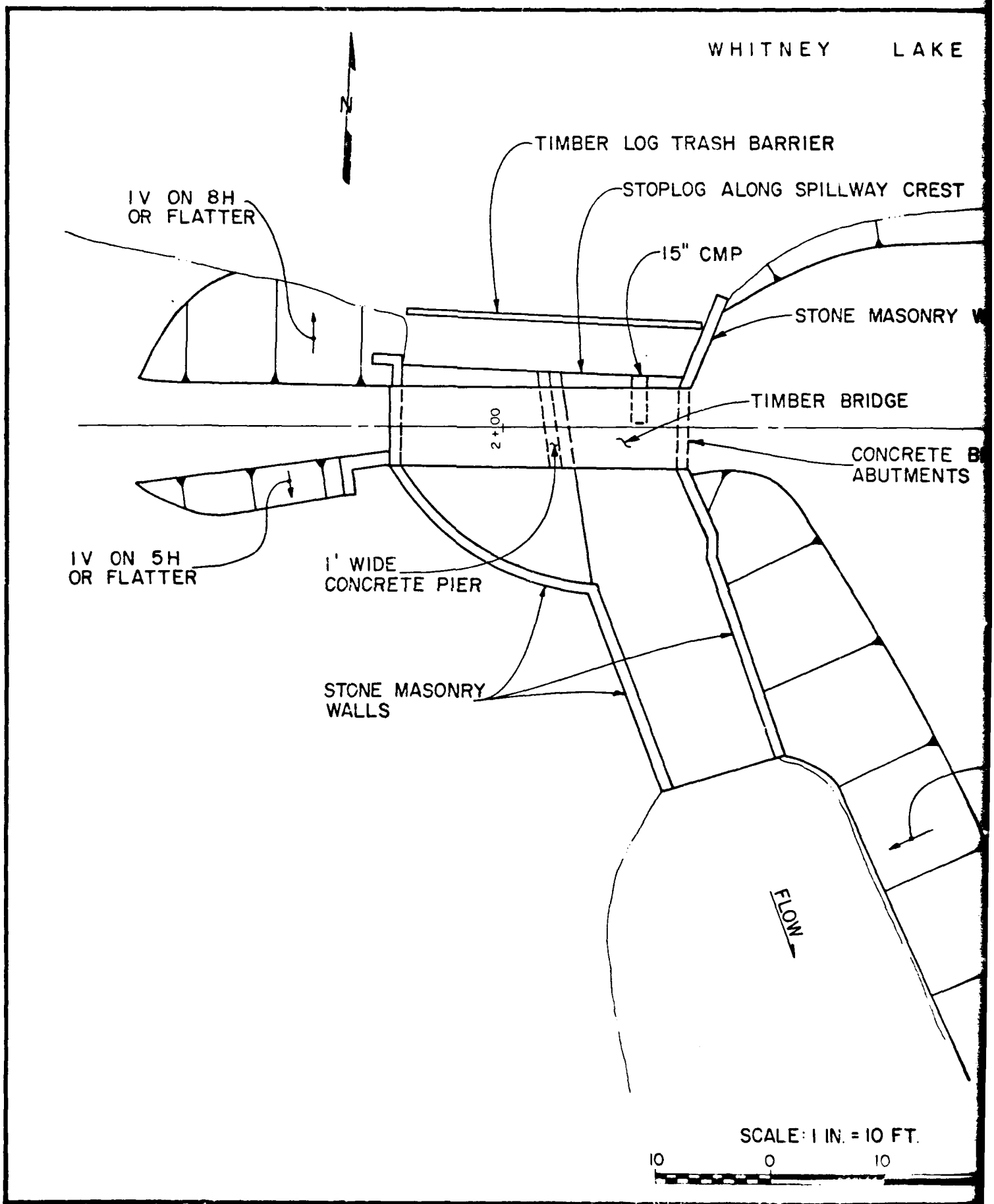
## DOWNSTREAM DEVELOPMENT PLAN

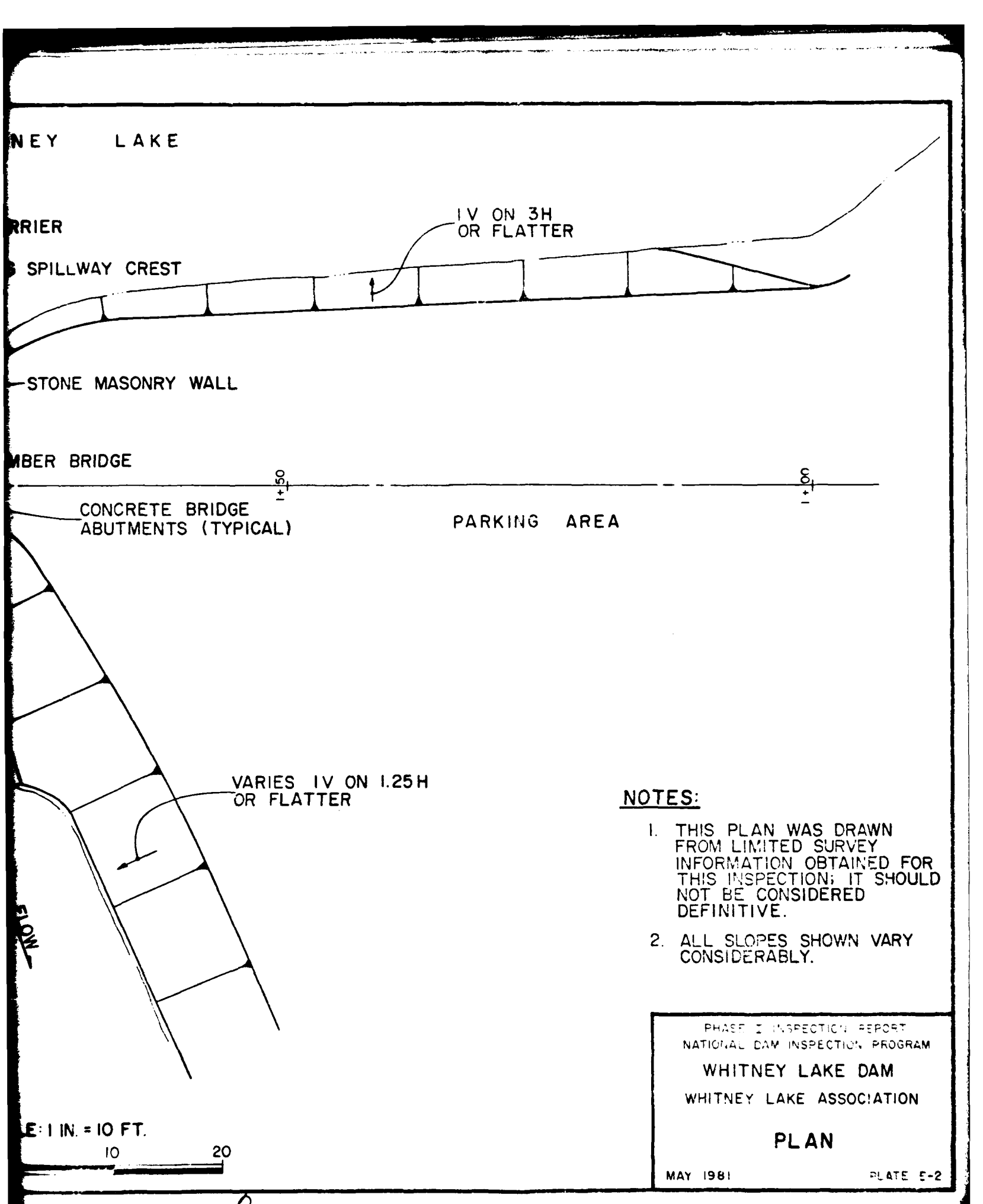
MAY 1981 EXHIBIT D-1

# APPENDIX E

# PLATES


WHITNEY LAKE DAM
ERRATA IN USGS MAPPING
7 1/2 MINUTE QUADRANGLES:
HAWLEY, PA.
LAKEVILLE, PA.
WHITNEY LAKE DAM
SMALL DAM
SMALL DAM
SPINNER BROOK
PA. ROUTE 590
SMALL DAM
LAKE WALLENPAUPACK
2000 0 2000
SCALE: 1 IN. = 2000 FT.
PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
WHITNEY LAKE DAM
WHITNEY LAKE ASSOCIATION
LOCATION MAP
MAY 1981
PLATE E-1


WHITNEY LAKE
N
TIMBER LOG TRASH BARRIER
STOPLOG ALONG SPILLWAY CREST
1V ON 8H
OR FLATTER
15" CMP
STONE MASONRY W
TIMBER BRIDGE
2+00
CONCRETE B
ABUTMENTS
1V ON 5H
OR FLATTER
1' WIDE
CONCRETE PIER
STONE MASONRY
WALLS
FLOW
SCALE: 1 IN. = 10 FT.
10 0 10




## NOTES:

1. THIS PLAN WAS DRAWN FROM LIMITED SURVEY INFORMATION OBTAINED FOR THIS INSPECTION; IT SHOULD NOT BE CONSIDERED DEFINITIVE.
2. ALL SLOPES SHOWN VARY CONSIDERABLY.

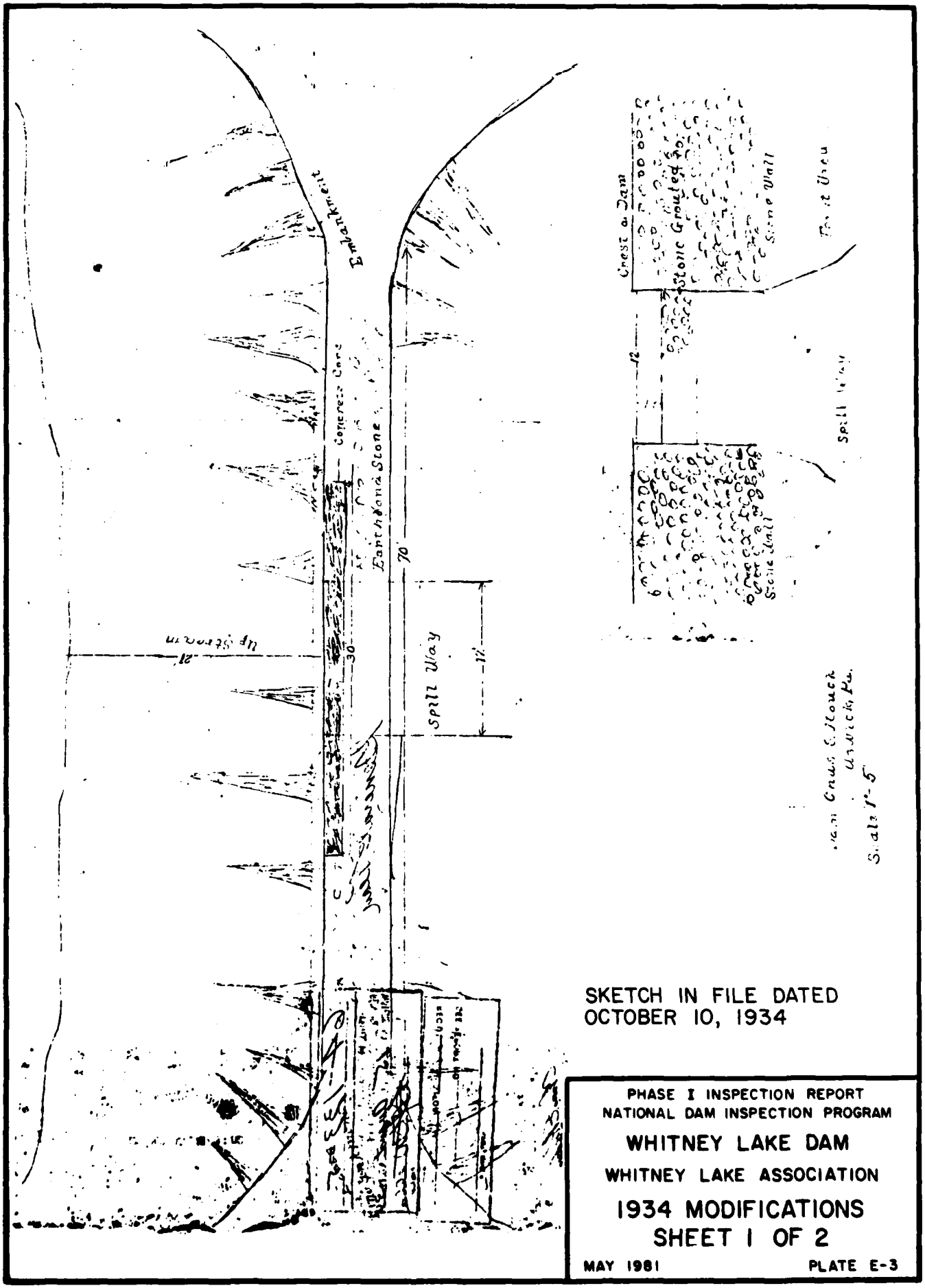
PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

WHITNEY LAKE DAM

WHITNEY LAKE ASSOCIATION

# PLAN

MAY 1981 PLATE E-2




SKETCH IN FILE DATED
OCTOBER 10, 1934

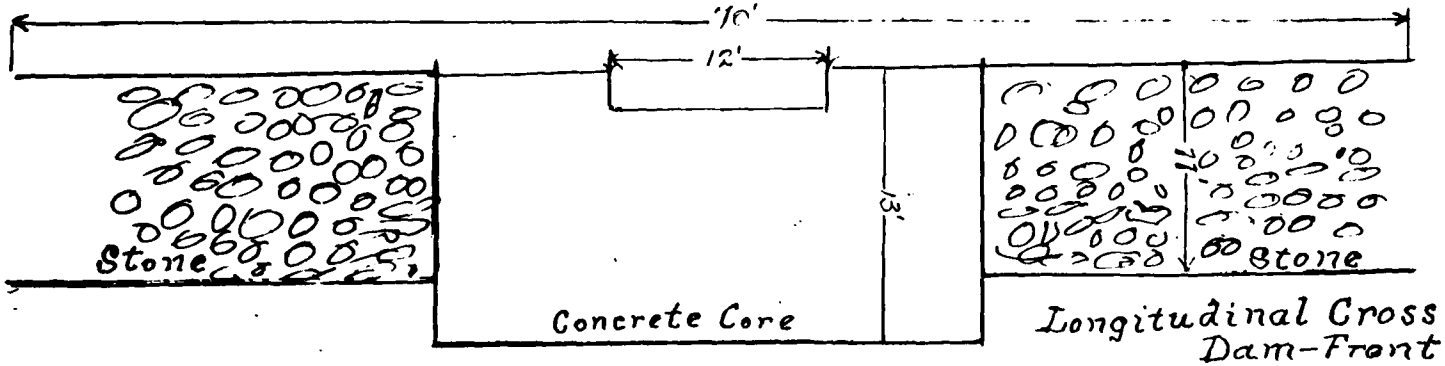
PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

# WHITNEY LAKE DAM

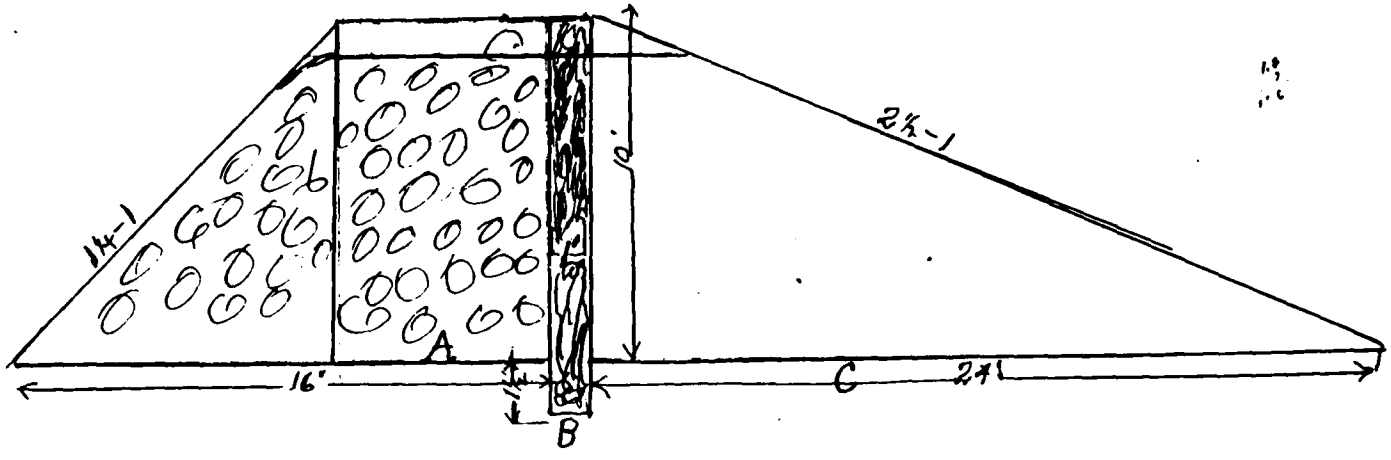
WHITNEY LAKE ASSOCIATION

## 1934 MODIFICATIONS
## SHEET 1 OF 2

MAY 1981 PLATE E-3




Longitudinal Cross Section
Dam-Front
1"-7'




A-Stone Wall 6' Thick
B-Concrete Core 1' Thick.
C-Earth Fill.

Cross Section Dam
Chas. S. Houck

1"-4'

SKETCH IN FILE DATED
OCTOBER 10, 1934

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

WHITNEY LAKE DAM

WHITNEY LAKE ASSOCIATION

1934 MODIFICATIONS
SHEET 2 OF 2

MAY 1981

PLATE E-4

# APPENDIX F

# GEOLOGY

# WHITNEY LAKE DAM

## APPENDIX F

## GEOLOGY

Whitney Lake Dam is located in Wayne County within the Appalachian Plateau Physiographic Province. The most pronounced topographic feature in the area is Camelback Mountain, which is part of the Pocono Plateau Escarpment. The escarpment has a well-defined, southwestward trend from Camelback Mountain, but it is irregular between Camelback Mountain and Mt. Pocono, which lies to the north. Streams east of the escarpment drain directly to the Delaware River, while those to the west drain to the Lehigh River.

The Pocono Plateau Section lies to the west of the escarpment. This area is relatively flat, with local relief seldom exceeding 100 feet. The topography has been greatly influenced by continental glaciation. Many features were created by deposition of glacial materials. The entire plateau lacks well-developed drainage.

East of the escarpment is the Glaciated Low Plateaus Section of the province. This area is characterized by preglacial erosional topography with locally-thick glacial deposits. Local relief is generally 100 to 300 feet.

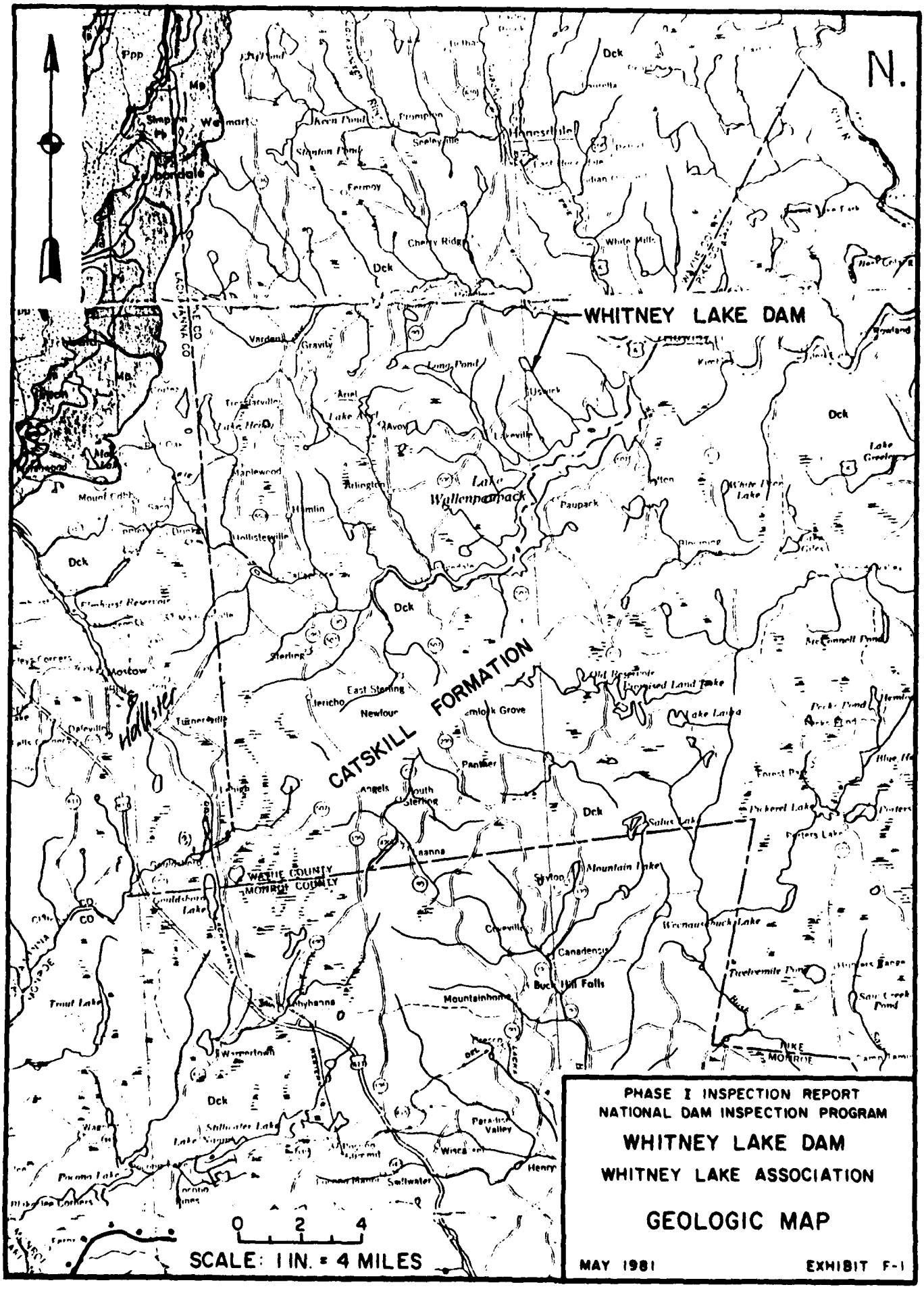
Bedrock units of the sections described above are the lithified sediments of offshore marine, marginal marine, deltaic environments, and fluvial environments associated with the Devonian Period. These units include siltstones of the Mahantango Formation, siltstones and shales of the Trimmers Rock Formation, and seven mapped members of the Catskill Formation. These members include sandstones, siltstones, and shales of the Towamensing Member; sandstone, siltstone and shale of the Walcksville Member; sandstones, siltstones and shale of the Beaverdam Run Member; sandstone and shale in the Long Run Member; sandstones and conglomerates in the Packerton Member; sandstones and some conglomerates in the Poplar Gap Member; and sandstones and conglomerates in the Duncannon Member.

Whitney Lake Dam is underlain by the Catskill Formation. The Catskill Formation is predominantly red to brownish gray shales and sandstone with interbedded siltstones and conglomerates. Sandstones present are thickbedded, fine- to coarse-grained and exhibit very low primary porosity due to a clay and silica matrix. Effective porosity results from fractures and parting planes.

The rocks are well-indurated and generally are not susceptible to slope failure; however, the presence of well-developed bedding and joint planes will result in some rockfall from vertical and high-angle cut slopes.

Bedrock is entirely overlain by glacial till of Late Wisconsin Age. This till is an unsorted mixture of clay, silt, sand, and gravel. It is moderately cohesive and is generally derived locally from the sandstones of the Catskill Formation. Thickness of the till varies from 5 to 75 feet.

Foundation conditions at the damsite are not known. No rock outcrops were observed at the dam. The available records do not indicate the foundation conditions.




PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

# WHITNEY LAKE DAM

WHITNEY LAKE ASSOCIATION

## GEOLOGIC MAP

MAY 1981 EXHIBIT F-1